Red? Discolored Water?

What causes this to happen?

Let’s look at our treatment process

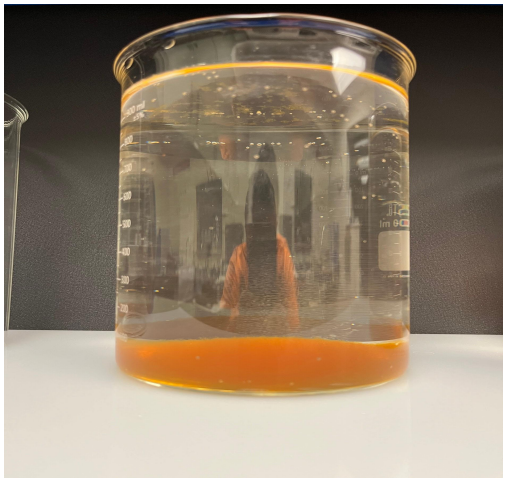
- In August 2008 the water treatment facility went online.
- Arsenic is our primary contaminant of removal.
- We use an iron chemical called ferric chloride as primary coagulant.
- The Arsenic binds to the ferric chloride then we use membrane filtration to remove the arsenic from the water.

What causes the red or discolored water?

- The ferric chloride chemical used for arsenic removal is made up of iron, manganese and other constituents.
- The dissolved iron and manganese are able to pass thru the filters.
- Chlorine (oxidant) is then added to the water for disinfection and providing free chlorine within the distribution system.
- The free chlorine can oxidize the dissolved iron and manganese.
- Creating the red discolored water.

Why does this happen in our distribution system?

- When the iron and manganese oxidize out it settles in the bottom portion of the water mains.
- Having an event, such as a fire or a water main break, that causes the velocity within the water mains to speed up mixes the settled sediment at the bottom.

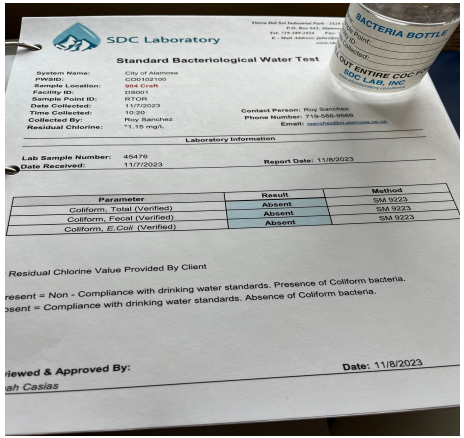


Is this red - discolored water safe?

- Yes. Iron and manganese are considered a secondary maximum contaminant within Colorado Primary Drinking Water Regulations.

11.45(8) Secondary Maximum Contaminant Levels (a) These contaminants in drinking water primarily affect the aesthetic qualities relating to the public acceptance of drinking water.

PG 369 Primary Drinking Water Regulations.



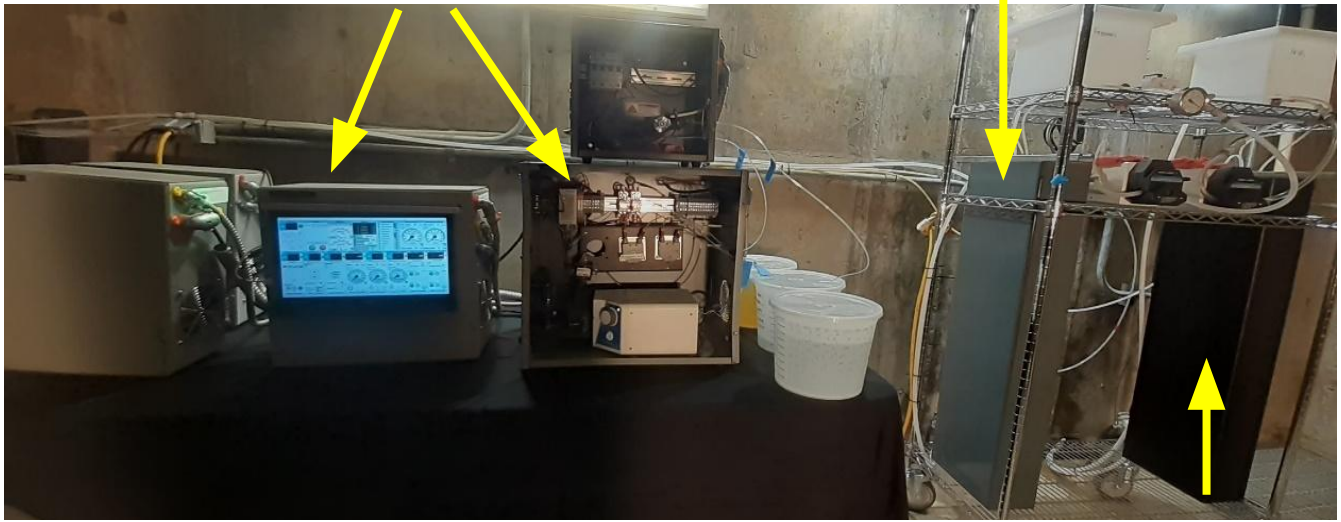
What are we doing to minimize occurrences?

- Proactively flushing water mains to remove sediments.
- Cleaning storage tanks more frequently.
- Replacement of old cast iron water mains.
- Currently we working with Aqua Metrology Systems (AMS) to evaluate the use of a cleaner iron compound chemical to use for arsenic removal. This chemical can be made in situ (in place) within our facility and can provide higher quality water leaving the drinking water facility while still providing excellent arsenic removal.
- We ran a small scale pilot to confirm this using current iron chemical against the in situ chemical.

Pilot Demonstration System

Ferrous Reagent Generator

Electrolytic Reagent Module



Bulk Ferric Chloride Module

Chemical Analysis From Pilot Study

Parameter	Bulk Ferric Chloride Reagent (mg/L)	Electrogenerated Ferrous Reagent (mg/L)
Antimony	0.378	0.0008
Beryllium	0.002	< 0.0006
Copper	112.91	2.56
Iron	**> 14000**	**2865.35**
Lead	< 0.001	< 0.001
Manganese	**951.48**	**5.789**
Molybdenum	8.092	1.159
Nickel	21.546	0.841
Selenium	0.094	0.004
Silver	0.122	0.006
Thallium	< 0.0002	< 0.0002
Zinc	28.8	0.97

Source: Analytical Results conducted by SDC Laboratory located at Tierra Del Sol Industrial Park, 2329 Lava Lane, P.O. Box 642, Alamosa, CO 81101

Conclusion from small scale pilot

- The in-situ chemical is higher quality then bulk chemical.
- Using a higher quality chemical provides higher quality water.
- It can provide better arsenic removal while using 27% less chemical.
- Demonstrated ability to remove arsenic to below 5 ppb.
- In-situ chemical can provided lower manganese levels in filtered water.
- Using 27% less chemical can provide less iron and manganese in filtered water again providing less discolored water.

Next step? Full scale demonstration.

- Currently we are working with an engineering firm, AMS, and CDPHE.
- We are needing to perform a full scale demonstration within our facility prior to implementation.
- This demonstration will confirm-deny our conclusions from our small scale pilot study.
- This demonstration will be engineered and approved by CDPHE prior to commencement.

What should I do if I have discolored water?

- Contact the City of Alamosa public works department at 719-589-6631. If after business hours contact Colorado State Patrol Dispatch at 719-589-5807.
- Once we are notified personnel will conduct fire hydrant flushing within your area.
- Do not use your washing machine or dishwasher.
- When flushing is completed remove the aerator from your kitchen or bathroom sink and run the cold water until discoloration ceases.